A.P. Bioenergietechnik GmbH
Traeglhof 2
D 92224 Hirschau
Tel.: +49.9608.9230128
Fax: +49.9608.913319
Email: info@oeko-therm.net

OPERATING INSTRUCTIONS

SERVICING INSTRUCTIONS

BIOMASS HEATING INSTALLATION COMPACT

C0 / C1 / C1L

WITH CONTROL AM I 2.X

Com.: ***Hilltop Farms - C1L***

Com.-Nr.: ***1613/10***

TABLE OF CONTENTS

1. Description of the installation

1.1 Function
1.2 Installations C0 / C1/C1L
1.3 Setting up the installation “Compactanlage” C0 / C1 / C1L
1.5 Heating-sided installation of the installations “Compactanlagen” C0 / C1 / C1L
1.6 Stoker unit with fire prevention shutter
1.7 Ashes slide
1.8 Section of Stoker unit installation “Compactanlage” C0 / C1 / C1L
1.9 Feeding conveyor
1.10 Kettle cleaning and servicing of the installation

2. Assembly tips of the control AM I

3. Safety-technical facilities

3.1 Automatic return
3.2 Safety shutter
3.3 Sprinkler system (back fire-extinguishing)
3.4 Safety thermostat STB
3.5 Door switch of boiler’s door
3.6 Safety switch (overfilling)
3.7 Main switch
3.8 Ashes thermostat
3.9 Low-pressure supervision
3.10 Safety temperature device (overheating)

4. Combustion course

4.1 Combustion control
4.2 Automatic ignition

5. Putting into operation of the heating installation

5.1. Before first putting into operation
5.2. To pay attention for operation
5.3. To heat up the installation

6. Instructions to special dangers with operations of the installation
6.1. General
6.2. Safety temperature limiter

7. Electric ashes slide

8. Radial Ventilators

8.1 Automatic Pipe Cleaning Device: "PUTZMAUS"

9. Drives
9.1. Light barrier stoker

10. Summaries

11. Installation scheme, proposal to install pipesystem
11.1. Pump programme AM I - Compact

12. Chimney connections

13. Switch plans

14. Guarantee services

15. Operating instructions of combustion's optimizing AM I

16. Malfunctions and repair

Close the access to the operating zone of the installation for unauthorized people before starting servicing or repair work! Attach or put up a Signboard which draws the attention to the servicing or repair works!

Switch off the main switch for the electricity supply and protect it by padlock before servicing and repair work!. The key to this padlock has to be in hands of that person who carries out the servicing or repair work!

When exchanging heavy installation parts use only suitable and flawless load facilities and connecting means!

Make sure that all to be touched parts of the installation have cooled off to ambient temperature before servicing and repair work!

Decontaminate environmentally hazardous lubrication, coolants or cleaning agents properly!

Works on the electric equipment

Repair work on electric equipment of the installation may be carried out by a qualified electric expert only!
Check electric equipment regularly!
Fasten loose joints again!
Exchange damaged wires / cables immediately!
Keep switch console always shut! Access is permitted to authorized people with key / tools, only!
Never splash switch consoles and other cases of electric equipment when cleaning by water hose!

Work on hydraulic and pneumatic equipment

To get servicing and repair work on hydraulic and pneumatic equipment carried out by especially for it qualified staff, only!
Deflate the pneumatic and hydraulic equipment of the installation completely before servicing and repair work!
Exchange tube pipelines in preventive maintenance regularly, even if no damages are to be seen! (Follow appropriate information of the manufacturers!)
After servicing or repair work, but before putting into operation

- Tighten all screw joints!
- Make sure, that removed container lids, sieves or filters are mounted on again!

Guarantee, that after completion of servicing or repair work but before resumption of the production

- All material, tools and other equipment required for carrying out servicing or repair work have been removed from the operating zone of the installation!
- Remove all possibly leaked out liquids!
- All safety facilities of the installation work perfectly!

Follow environment protection regulations

Meet legal liabilities in regard to waste avoidance and proper utilization/removal with all works in and with the installation!

Above all water harmful material as

- Greases and lubricating oils
- Hydraulic oils
- Coolant
- solvent-containing cleansing liquids

may not impact the ground and may not reach sewerage!

These materials must be kept in suitable containers, then be moved, then caught up and finally decontaminated.

C 0	**capacity range:**	**16 - 49 kW**
C 1	**capacity range:**	**29 - 88 kW**
C 1L	**capacity range:**	**40 - 120 kW**

suitable for:

according to size of means of transport
- agropellets, e.g., triticale, rape, etc.
- fine chaff material, forest caff material, saw chaff material up to max. 35% of water content
- industrial chaff material up to max. 35% of water content
- max. size of chaff material: length 60 mm, cross section 2 cm³
- max. dust content 5%.

not suitably for:

- dust, abrade cuttings, fine sawdust
- chaff material with long wooden pieces (more than 170 mm),
  or wooden pieces with cross section greater 4 cm².

Attention: Follow important instruction to combustion of biomass

1) Description of the installation

1.1 Function

Fuel located in fuel dump is transported by the feeding conveyor to the combustor. Through the safety shutter the fuel material reaches the screw conveyor that transports the fuel in the combustion chamber of the kettle. There the directed combustion of the fuel takes place by supply of primary air and secondary air. The complete installation is controlled by a central switch console with AM I-processor control. The installation is controlled fully automatically over capacity range between 30% and 100%, (in case the installation is equipped with a Lambda-control module). The switch console also controls all safety-technical facilities.

1.2 Installations C0, C1, C1L

The special installations C 0 - C 1L were developed especially for combustion of bio-fuels. The combustion chamber is formed that way that the combustion of the fuel can be carried out in a water-cooled burning base and the post-combustion in the burning upper part aided by heavy fire-clay. This way it is possible to use all bio-fuels up to a water content of 35%. The heat exchanger is made of strong-sided sheet steel and is equipped with two flue gas outlets. These flue gas outlets are easy to clean, because a spaciously dimensioned cleansing door allows free access to the interior of the kettle.

The capacity range of the kettle is of between 30% to 110% of the rated capacity. In case the kettle is operating in the lowest capacity range of 30%, the flue gas temperature drops according to fuel quality under 90°C. To avoid in this case chimney damages by falling short of dew-point, a dew-point-proof chimney (high-grade steel or ceramics) is to be used for this operating phase. If a dew-point-proof chimney could not be used, the electronic stop of fuel-gas temperature has to be activated by setting the minimum flue-gas temperature on dew-point-proof flue-gas data (more than 100°C).

1.3 Commissioning of the installation “Compactanlage”

Installations C 0 - C 1L have to be set up in the boiler-room according to installation plan. The installation must be aligned this way the distance is precisely followed to fuel dump room. Installation will be removed from transport rack, the lifting butt strap is under the upper covering (see drawing).
The water-sided connection of the boiler may be carried out after setting up only, the pipes should be laid in a distance of 30 cm to the covering. Afterwards the stoker unit is to be screwed on with down-shaft base to the installation.
Doing this it must be heeded the stoker unit to be flanged horizontally to the installation by using sealing cord.
Afterwards the feeding conveyor is to be placed concentricly with the down-shaft upper part in the fuel-dump room and is to be screwed on to stoker unit.

The switch console is to be set up in suitable distance to the installation (to serve easily).

The switch console is to be fixed by provided dowels.
The cables are numbered and must be connected with cables of installation.
Cable Nr.14 is to be connected directly with the pressure measuring box.
Transmitters and receivers are to be mounted on fixing of stoker's down-shaft.
Test of rotation direction to be carried out (right rotary field).

1.5 Heating-sided installation of the installation "Compactanlage" C0/C1/C1L

The heating-sided installation has to be carried out according to safety-technical instruction. The compliance with all rules and instructions is to be absolutely prescribed. The return increase must be adjusted on 65°C. The return sensor is to be fixed to the return main.

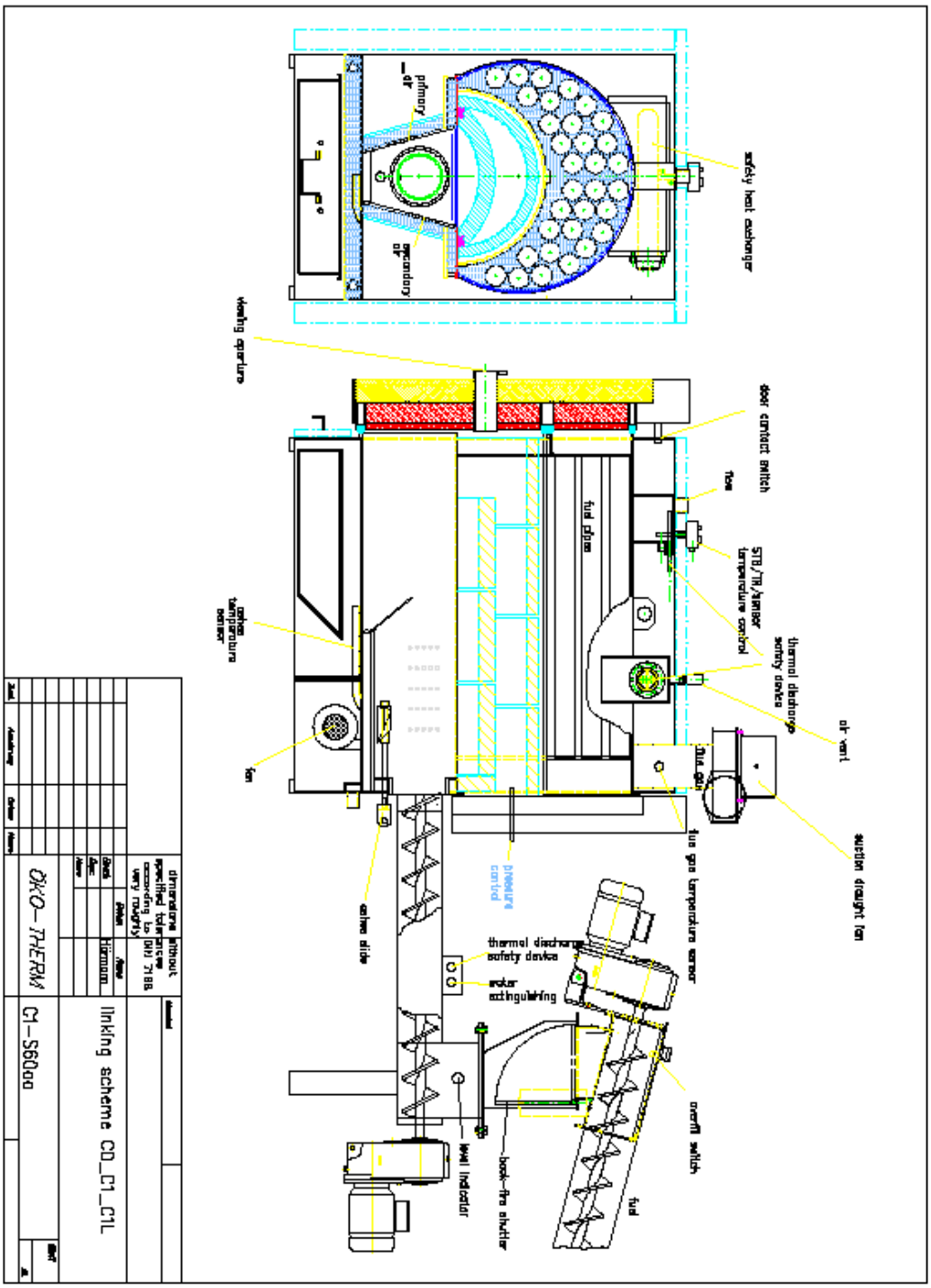
1.6 Stoker unit with fire prevention shutter

The stoker unit consists of down-shaft base with Stoker's gear and stoker's screw conveyor. The fire prevention shutter or the hydraulic back fire slide is being on down-shaft base. The sprinkler valve is fixed also there.
In case Stoker's screw conveyor is used as dose screw conveyor, a light barrier must be installed in the down-shaft as filling state control.

1.7 Ashes slide

The ashes slide consists of heat-resistant castings, thrust bar, sealing bush, electric servomotor and ashes slide's rack. The sealing bush is provided with long holes and can be adjusted in height to guarantee a horizontal run of the ashes slide linkage.

1.8 Section of stoker unit installation „Compactanlage“ C0/C1/C1L



1.9 Fuel discharger

The fuel discharger consists of a geared motor to power the screw conveyor, a screw channel and a intergear. The mixing work is powered through the intergear. The mixing work transports the fuel into the screw conveyor. From there the fuel is transported to the down-shaft. Fuel reaches the stoker screw through fire preventing shutter (back fire slide). From there fuel is delivered into the combustor. The material dosage can be carried out by screw conveyor according to fuel and transport system, or by stoker screw. (When dosage shall be carried out by stoker screw the installation must be equipped with a filling state control mounted in down-shaft).

Montage of fuel discharger of the installation “Compactanlage”

Montage of the fuel discharger is very simple. The feeding screw is delivered as one unit and has be screwed on the stoker unit at site.
First the intergear box has to be put on the right height by provided props. (The mixing work arms may not touch the silo ground at the underside). The props for the intergear must be screwed on the ground.
Afterwards the screw canal is to be mounted on the connection flange of the back fire shutter or the hydraulic back fire slide.

1.10 Kettle cleaning and servicing of the installation

An optimum kettle cleaning influences the efficiency and the life span of the boiler.

Everyday control:

- optical and acoustic control during operation of the installation
  (Flame length and color, height of the glow bed, water temperature)

Weekly control:

According to fuel the ashes drawer of the combustion chamber is to be cleaned weekly or if required. In case fuels of high dirty and/or sandy portions are being used, the time interval is to be shortened for ashes slide (ashes screw), moreover, the installation must be cleaned more often.

- To clean ignition and ignition pipe hole
  (when using very dirty and wet fuels - several times per week)
- To check ashes discharger
- To empty ashes drawer if required
- To check flue gas temperature, normally approx. 200°C, in case of higher temperature kettles to be cleaned
- To check fire-fighting valve of the thermal protection

Monthly:

Surface of the heat exchanger and the burn-out zone are to be cleaned at least monthly.
The isolation of the door inside and back may be cleaned with a broom only.
Remove lightly adhering residues only. Moreover, the safety-technical facility must be checked monthly (back fire fighting device, STB, safety switch).

Semi-annual control:

- Check conveyor facility and mixing work for wear, break, tightly fittings
- Lubricate conveyor facility
- Check gearing motors for leakproofness and fixation, refill if necessary oil and seal
- Check flue gas fan for firm seat, soiling and imbalance
- Lubricate bearings of stoker and discharging screw
- Remove incrustations from combustion bowl and stoker input
- Check true running of the suction draught fan and clean if necessary

Annual control:

The heating system must be completely cleaned yearly, furthermore to clean the suction draught fan if available. Moreover, the heating installation must be checked by an expert yearly, the safety-technical facilities is to be controlled and the combustion setting is to be corrected if required.

- Visual inspection of the ceramics to check for strong cracking and break
- Return temperature on at least 62°C
- Filter change of the hydraulic installation, if available
- Cleaning of the flue gas pipes
- Cleaning of the supply air distribution boxes
- Check of all safety facilities
- Cleaning of the lambda sensor
- Cleaning of the flue gas sensor
- To carry out functional control of safety heat consumer

To be able to guarantee the greatest possible economic efficiency of the heating installation, we recommend you to get your installation checked up by our skilled staff before the beginning of every heating period.

Dry-out of the ceramics

Heat the installation for a period of 1 hrs with 30% of the nominal capacity, with an exhaust gas temperature of approx. 90C ° (small flame).
Then increase the capacity in the course of next 2 hrs slowly up to nominal capacity.
The capacity can be reduced by overtime of pause periods. In case the flame becomes too big or the exhaust gas temperature too high, switch off the installation switch

2) ***Installation instructions of the control AM I, 1.x***

1. Care must be taken when installing the console that it is slightly accessible, the electric installation must be carried out by an electric expert.

2. Care must be taken when wiring the sensors that they are not laid in one duct with the three-phase current cables.

3. The three-phase motors must be connected with 7 fibers cable:
   3 phases for three-phase current, neutral on star point, thermal motor supervision (if available) and ground wire.

3) Safety technical facilities

3.1 Automatic return

FOR STOKERS ONLY
Drive motor's polarity will be reversed automatically and motor will run return in case of blockage of plug-in screw (e.g., by a too big wooden piece).
The return time is adjustable infinitely variable and should not exceed 0.5 sec. This automatic return is activated three times. Nevertheless, before the max loading capacity of the drive motor will be exceeded, the whole installation will switch over to breakdown (display information "malfunction over-current motor")

3.2 Safety shutter

Safety shutter is a back fire protection and is designed as 90 ° - rotary shutter. The feather mechanism will also guarantee sure fastenings of the shutter in case of power failure. The installation will be additionally equipped by a back-fire thermostat (optional) when using strongly back-fire endangered materials. When responding of this thermostat in the screw pipe the fire prevention shutter is closed immediately and the installation switches off. (display information "temperature switch insert for the heater".

3.3 Sprinkler system (back fire fighting)

A mechanical valve is installed in the front area of the plug-in screw that opens the water influx in case of back fire in the stoker's screw and extinguishes the back fire. The opening temperature is fixed (approx. 90°C). Care must be taken when connecting the water pipe that the pipelines have been rinsed cleanly (use water filters).

3.4 Safety thermostat STB

A safety thermostat is installed in the kettle.
By using the safety thermostat it is guaranteed that a flow temperature of max of approx. 95°C is not exceeded. Should this temperature be exceeded for whatever reasons, though, the installation will be switched off.
To repair this failure the small black protective cap of the safety thermostat is to be unscrewed to press the underlying red key.

ATTENTION: Before doing this of course the kettle temperature has to be lowered again to below 80°C. Afterwards the switch console has to be switched off and again switched on using the main switch.

3.5 Kettle's Door switch

After opening kettle's door both supply air fans and the feeding are switched off immediately. The installation switches over to "malfunction door supervision" after an adjustable time (work setting 90 sec.). After fastenings of the kettle's door and pressing the "OK-key" the installation goes back to operation.

3.6 Cover switch

In case the installation is equipped with a cover switch as overfill protection, it must be closed completely, because it closes down the whole installation, otherwise (display: malfunction overfill switch").

3.7 Main switch

The AM I control is equipped with a main switch.
The main switch is right in front of the switch box and interrupts the whole power supply line to the switch box.

3.8 Ashes thermostat

The ashes thermostat protects the installation from overfilling of the combustion bowl during heating operation. The sensor is right in the area of the ashes drawer. The regulator is right in the front end of the heating installation and has a control range of 0 - 300°C.
When reaching the set temperature the installation is switched off.

3.9 Vacuum pressure control

Vacuum in the combustion bowl is controlled by means of a pressure controller.
If an overpressure is generated (e.g., malfunction of suction draught fan), both air supply fans switch off immediately. If this condition is continued longer than 30 seconds, installation goes over to malfunction.

Display: "malfunction vacuum".

3.10 Temperature controller

The temperature controller protects the kettle from overheating, in addition to the STB.
It has a set range of 30 - 90 °C, "factory setting 90 °C". In case of exceeding installation will be switched off and malfunction message will appear (display" malfunction temperature controller"/KTW).

4) Combustion process

4.1 Combustion control

The control of the combustion process is controlled by a microprocessor. This processor regulates the whole combustion process. The integrated power control regulates the combustion in the capacity range of 30 - 100%. (power control is possible in case installation is equipped with lambda sensor, only.) The oxygen content of the flue gas is determined by lambda sensor and secondary air is regulated accordingly.
By this combustion regulation optimum combustion values will be reached in the whole capacity range.

For installations version 1.24a, 2nd fuel line the fuel is ignited with line 1 e.g. pellets, when reaching the set flue gas temperature (range from 100°C - 300°C) it is switch over to line 2, e.g. grains.

4.2 Automatic ignition

The automatic ignition allows a fully automatic operation of the installation and a starting and shutoff of the installation by an integrated timer.
After release of the heating operation the installation starts conveying fuel sequentially into combustion bowl.
In case ignitable glowing rests are still available they light the filled fuel, this way the operation is switched over from ‘ignition’ to ‘power fire’ after rising of the flue gas temperature.
If no glowing rests exist, though, fuel is filled in a preprogrammed time and is lighted then by hot air. If the flue gas temperature exceeds the specified temperature within the set time, the installation is switched back to ‘power fire’. Should the ignition attempt be unsuccessful within the set ignition time, the ignition attempt is interrupted displayed “ignition attempt unsuccessfully”.

5) Commissioning of the heating installation

5.1 Before start of initial commissioning

There is a so-called condensed water formation in the kettles!
This is normal and is no malfunction (it may continue up to one week)!

Check whether a sufficient ventilation of the installation-room is guaranteed.
(Cross section at least as diameter of the fuel-gas pipe)

Check whether enough water is in the heating system (look at manometer).

Check whether the necessary control and safety facilities (thermal process safety device and/or safety temperature limiter, boiler safety valve (higher than 120 kW - 2 pieces), sprinkler system, return flow increase, ventilation, expansion vessel, exist. The operativeness is be checked yearly.

5.2 Notice for operating

Heating-up in general with dry material only so a sufficient temperature of the combustion bowl can be reached, (fireclay starts to glow).

Temperature of kettle and return never lower than 60 °C!

5.3 Heating-up the installation

Switch on the main switch!
Conveying fuel starts after opening the fire-prevention shutter according to set conveying cycles “power fire-plug-in and power fire break min”. In case the installation is equipped with automatic ignition fuel will be conveyed into the combustion bowl according to set “plug-in time ignition”. If there is no rising of fuel gas temperature within plug-in time (to be measured by fuel gas sensor) ignition is started by microprocessor. When fuel is lighted and the fuel gas sensor finds out a temperature rise in the flue gas, ignition stops and the installation is switched over to power fire.
If no rise of the flue gas temperature is stated within set ignition attempt time, though, there is a display “**ignition attempt without success**".

Food and circulation water:
Bad food and circulation water can lead to deposits on the water side.

Boiler scale
The heat transfer is reduced. The pipe wall temperature is increased.

Result:	overheating
Damages:	blasting of the pipes
	Thermo shock
	High temperature cracks

For this reason a preventive water treatment and an everyday check of the food water and circulation waters must be carried out. The following standards must be kept:

Max hardness:	0.2 dH
pH range:	9.5 - 10
fenolftalein-value (P value):	2 - 4
phosphate concentration:	20 - 50 mg/l.

The oxygen concentration had to go less than 0.02 mg/l or, however, at least balance of sodium sulfate must be due to oxygen abrasions.

6) Indications of special dangers when operating the system

6.1 Universal

During servicing work on the heating installation it must be guaranteed, that heating installation cannot switch on itself automatically.
Switch construction-sided heating emergency "OFF" or main switch "OFF".
When using a hydraulic burn-back protection the pressure accumulator is to be emptied additionally.
The installation of the heating system is carried out by the manufacturing firm. If the installation is carried out by other people, installation instructions can be requested any time.

The heating tubing and equipment must be carried out according to DIN and TRD. A tubing scheme is added to the manual. The cross section and the length for the chimney device has to be agreed upon with the local sweeper authorities.
The requirements of the local fire prevention are to be followed on-site.

Special sound preventive measures and dust preventive measures both within and beyond the whole installation, do not belong to the scope of supply of A.P. Bioenergietechnik GmbH.

6.2 Security temperature limiter

The security temperature limiter briefly STB exists of a combination of temperature limiter and temperature controller.

It is right directly beside the heating flow and should prevent overheating of installation in case of malfunction.

The cut-out temperature of the temperature controller is adjustable and should be min 10 °C higher than set installation specified temperature.

The cut-out temperature of the temperature limiter is fixed. In case of cut-out a resetting is possible after cooling down the heating system (lower 15°C) by unscrewing the black header and by pressing the release button.

Additional information about fast-acting control according to DIN 4751

As with biomass heating installations commonly, the ÖKO-THERM ® Compactanlage also contains considerable amount of fire-resistant ceramic components. After longer full-load operation these components strongly heat up and can lead to an inadmissible heating up of the kettle.
Overheating the kettle can be avoided by the installation of a safety heat exchanger (SWT) or by natural circulation in the heating net. Whether a sufficient natural circulation is given, depends on the heating net (height differences and kind of heat consumers). This can be checked by the heating construction company or the responsible planning office. If a sufficient natural circulation is not given, a safety heat exchanger must be installed. On this occasion, the following points of view are to be followed:

Safety pipe
The safety heat consumer is to be connected -as stated in the tubing scheme- between safety flow and one of both return necks to the kettle. The tube is to be carried out with nominal diameter of the flanges. Reductions and flow-hindering installations are inadmissible. The shut-off valves in the safety pipe are to be protected against unintentional closing. If the SWT is not be situated in the highest part of the tube an additional air bleed is to be provided. The SWT should be mounted high as possible, at least however, 2.5 m higher than kettle return neck with the outlet neck.

Cold water connection
The cold water inlet is to be carried out according to the connection to safety heat exchanger (3/4 "or 1"). The shut-off valves of cold water pipe are to be protected against unintentional closing. For opening the tube a thermal safety device with component testing (e.g., Braukmann) is to be used. The back-pressure of the supply pipe must be maintained at not less than 2 bar.

Hot-water outlet
The water running off from the SWT can exceed the prescribed maximum temperature for discharge into the sewers depending on flow rate. In that case the water must be cooled or be mixed with cold water. The outlet tube is to be mounted in such a way that also with failure of an elevating pump (power failure) the water can be safely discharged into the sewers.

Whether a different safety heat exchanger can be used than that one offered by the manufacturer, must be checked on case-by-case basis. But if a different safety heat exchanger is applied, no guarantee will be given for operativeness of the safety circle.

7) Electrical ashes slide

See enclosed external operating instructions

8) Radial Ventilators

See enclosed external operating instructions

8.1) Automatic Pipe Cleaning Device: "PUTZMAUS"

See enclosed external operating instructions

9) Drives

See enclosed external operating instructions

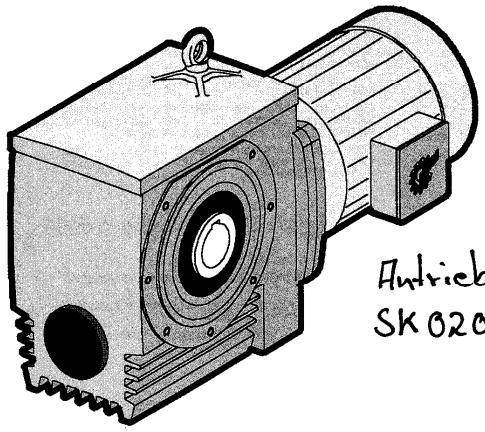
NORD

Betriebs- und Wartungsanleitung
Operating and Maintenance Instruction
Instructions de conduite et d'entretien

Diese Sicherheitshinweise sind aufzubewahren
These safety-instructions must be kept available
Ces instructions de sécurité doivent être observées

B 1030

D GB F



Antrieb_ Aschemotor
SK 02050 AZD-63 S/4TN

Schneckengetriebe
Worm Gears
Réducteurs à roue et vis sans fin

Δ Warnung
Es wird vorausgesetzt, daß die grundsätzlichen Planungsarbeiten der Anlage sowie Transport, Montage, Installation, Inbetriebnahme, Wartung und Reparaturen von qualifiziertem Personal ausgeführt bzw. durch verantwortliche Fachkräfte kontrolliert werden. Bei Arbeiten am Getriebemotor muß garantiert sein, daß keinerlei Spannung anliegt und dieser gegen Wiedereinschaltung gesichert ist.

Δ Warnung
Veränderungen gegenüber dem Normalbetrieb (höhere Leistungsaufnahme, Temperaturen, Schwingungen, Geräusche usw.oder Ansprechen der Überwachungseinrichtungen) lassen vermuten, daß die Funktion beeinträchtigt ist. Zur Vermeidung von Störungen, die ihrerseits mittelbar oder unmittelbar schwere Personen- oder Sachschäden bewirken könnten, muß das zuständige Wartungspersonal dann umgehend verständigt werden.

Δ Im Zweifelsfall die entspechenden Betriebsmittel sofort abschalten!

Aufstellung, Vorbereitung
- Transportösen am Getriebe sind für das Gewicht des Antriebs ausgelegt
- Fundamente ausreichend bemessen und schwingungsfrei ausführen
- Getriebe oder -motor fest und ohne Verspannung montieren
- ausreichende Belüftung vorsehen
- serienmäßiges Innengewinde nach DIN 332 zum Aufziehen von Verbindungselementen auf die Wellen benutzen
- Schläge auf die Wellen vermeiden (Lagerbeschädigung!)
- Maschine und Getriebe möglichst mit elastischen Kupplungen verbinden
- vor dem Einschalten Abtriebselemente aufziehen bzw. Paßfeder sichern
- bei Aufsteckgetrieben mit Drehmomentstütze Gummipuffer verwenden

Δ Caution
It is presumed that fundamental project work as well as all work with regard to transport, assembly, installation, starting-up, maintenance and repair is performed by qualified personnel or supervised by skilled labour taking overall responsibility. Make absolutely sure that no voltage is applied at all while work is being done on the geared motor. Drive must also be secured against switching on.

Δ Caution
Any deviation from normal operating conditions (increased power consumption, temperature, vibrations, noise etc.) or warning signals by monitoring equipment suggest malfunction. Inform the responsible maintenance personnel at once to prevent the trouble from getting worse and causing, directly or indirectly, serious physical injury or material damage.

Δ In case of doubt disconnect the machine immediately!

Preparing and performing installation
- Transport lateches on drive are designed to carry the drive weight
- the foundation (base) should be of adequate size and vibration-proof
- install gear unit or geared motor rigid and braceless
- ensure sufficient ventilation
- make use of tapped hole (DIN 332) to suit fastening to the shaft end
- avoid shocks on shafts (bearing damage!)
- preferably use flexible coupling between output shaft and driven machine
- fit output elements to shaft end or secure feather key before starting the motor
- use torque arm with rubber buffer on shaft mounting gearboxes

Δ Avertissement
Il est impératif que les travaux fondamentaux de l'installation, ainsi que tous les travaux de transport, montage, installation, mise en exploitation, entretien et réparation soient accomplis par du personnel qualifié et contrôlés par des techniciens spécialisés dans ce domaine. Avant toute intervention sur le motoréducteur, il faut s'assurer que celui-ci n'est plus sous tension et que la remise sous tension soit interdite.

Δ Avertissement
Si en utilisation normale, des modifications de fonctionnement apparaissent telles que puissance absorbée trop élevée, température élevée, vibrations fortes, bruit intense ect. ou en rapprt avec les contrôles techniques, cela laisse supposer que différentes fonctions de l'appareil peuvent être détériorées. Pour éviter ensuite des problèmes, qui pourraient entraîner de graves accidents corporels ou de graves dégats matériels, le personnel d'entretien compétent doit immédiatement être informé.

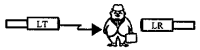
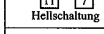
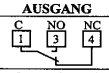
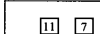
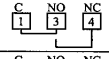
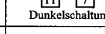
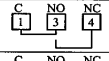
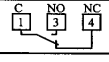
Δ Si vous êtes dans le doute, coupez immédiatement l'alimentation!

Mise en place, préparation
- Le matériel utilisé pour la manutention doit tenir compte du poids de l'équipement
- prendre largement les dimensions des embases et les réaliser exemptes de vibrations
- monter les réducteurs et motoréducteurs solidement et sans haubanage
- prévoir une aération suffisante
- prévoir le taraudage conforme à la norme DIN 332 pour monter des accouplements sur les arbres d'entrée et de sortie
- éviter de donner des coups sur les arbres (cela pourrait détériorer le roulement!)
- lier autant que possible la machine et le réducteur avec des accouplements élastiques
- avant la mise en service, enlever l'élément d'accouplement ou/et fixer la clavette
- utiliser pour l'exécution arbre creux avec bras de réaction une butée en caoutchouc

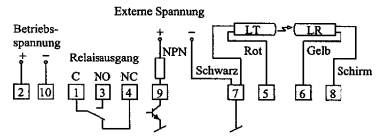
Bedienungsanleitung PA11 System

Telco sensors

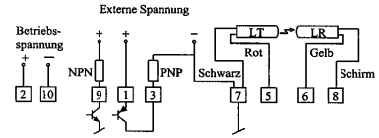
TECHNISCHE DATEN				
Betriebsspannung	24 VDC +/- 15 % ,	24 VAC +/- 15 %,	115 VAC+/- 15 %,	230 VAC +/- 15 %
Leistungsaufnahme	3,2 VA			
Relais-Ausgang PA11A/B	1 Wechsler (NC/NO);	250 VAC / 3 A;	120 VAC / 5 A	
PA11D/C	1 Wechsler (NC/NO);	250 VAC / 5 A;	120 VAC / 5 A	
Transistor-Ausgang NPN/PNP	60 mA / 30 VDC			
Hysterese	Ca. 45 %			
Schaltfrequenz	20 Hz			
Reaktionszeit, T_{EIN} / T_{AUS}	35 ms / 25 ms			
Verzögerung, t_{ON} / t_{OFF}	Einstellbar: 0 bis 10 Sekunden			
Sensor LED's	Die grüne LED am Empfänger signalisiert "Betriebsspannung liegt an" Die gelbe LED am Sender signalisiert "Ausgang geschaltet"			
Umgebungstemperatur (Betrieb)	-10 °C to +50 °C			
Umgebungstemperatur (Lagerung)	-40 °C to +80 °C			
Zulassungen	CE, UL, CSA			

LICHTSTRAHL	AUSGANGS-FUNKTION	AUSGANGS-LED	RELAIS-AUSGANG	TRANSISTOR-AUSGANG
	 Hellschaltung	Aus		Aus
	 Dunkelschaltung	An		An
	 Hellschaltung	An		An
	Dunkelschaltung	Aus		Aus

ANSCHLUßSCHEMA



PA11A/B30X

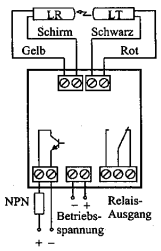


PA11A/B40X

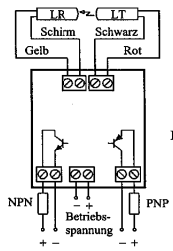
Bedienungsanleitung PA11 System

Telco sensors

ANSCHLUßSCHEMA



PA11D/E30X



PA11D/E40X

SCHALTABSTÄNDE & EXCESS GAIN			
SENDER- / EMPFÄNGER -TYPE	Kleiner Schaltabstand	Grosser Schaltabstand	EXCESS GAIN
LT 100 & LR 100	6 m	18 m	200 %
LT 110 & LR 110	13 m	40 m	200 %
LT 120 & LR 120	23 m	70 m	400 %

SYMBOLE	
	Betriebsspannungsanzeige
	Empfindlichkeitskontrolle
	Augang aktiv-Ausgangssignal
	Empfindlichkeitseinstellung
	Einschaltverzögerung
	Ausschaltverzögerung
	Dunkel- / Hell-Funktion
	Grosser / Kleiner Schaltabstand
LR	LR-Control-Anzeige
LT	LT-Control-Anzeige

- Wählen Sie den entsprechenden Sensor für Ihre Applikation
- Verdrahten Sie die Sensoren mit dem Stecksockel (oder direkten Anschluss beim PA11D und PA11E) wie in dem Anschlußschema abgebildet
- Verstärker in den Stecksockel stecken (ohne Betriebsspannung)
- Verkabelung kontrollieren, dann Betriebspannung einschalten
- Betriebsart wählen (Hell- oder Dunkelschaltung)
- Schaltabstand wählen (Grosser / Kleiner Schaltabstand)
- Die grüne LED (Empfindlichkeitskontrolle) signalisiert die korrekte Einstellung, die rote LED (Ausgang aktiv) signalisiert den Schaltzustand des Relais
- Bei Inbetriebnahme der Einweg-Lichtschranke wird die Empfindlichkeit mit dem Potentiometer vom Linksanschlag nach rechts drehend eingestellt, bis die grüne LED (Empfindlichkeit) kontinuierlich leuchtet. Wenn eine höhere Verschmutzungsreserve benötigt wird, muß das Potentiometer entsprechend weiter nach rechts gedreht werden.
- Ist eine Ein- oder Ausschaltverzögerung (PA11A und PA11D) gewünscht, so stellen Sie die entsprechenden Potis ein.
- Die roten LED's LT(Sender) und LR(Empfänger) signalisieren einen Fehler am entsprechenden Sensor (nur bei PA11A und PA11B). Der Fehler kann ein unterbrochenes Kabel , ein Kurzschluss oder ein defekter Sensor sein. Kontrollieren Sie die Verkabelung, sollte diese in Ordnung sein, so sollten Sie den Sensor austauschen.

TELCO A/S behält sich das Recht vor, technische Daten ohne vorherige Ankündigung zu ändern.

ÖKO THERM®

10) Summary

Servicing and inspection extent and intervals are to be set and recorded according to the size and importance of the respective installation.

Work in the area of the servicing and inspection which are prescribed by legal regulations and rules and regulations of the employers' liability insurance association must be carried out and recorded accordingly regardless of the operation-guaranteeing measures for reasons of the safety for the service staff and of preventing of possible material damages.
For the repair of installations all necessary documentation components and most important measurement devices are to be stored best on site to make fault finding as successful and short as possible.

11) Installation scheme, proposal of piping

Installation variations and modes of operation of *Control AM 1 for Compakt-installations*

This applies to all installation variations and modes of operation:

Mixer return flow increase
The return flow increase mixer adds hot flow water to water coming back from heating net or buffer to ensure that return temperature is only as little as possible lower than MINIMUM RETURN TEMPERATURE.
With RETURN FLOW MIXER REGULATION BREAK TIME the control speed of the mixer can be set to existing piping. The longer the break time the slower mixer regulates:

Parameter:

+/-	pumps / buffers	MINIMUM RETURN FLOW TEMPERATURE
+/-	pumps / buffers	RETURN FLOW REGULATION BREAK TIME

'Short circuit' pump
The 'short circuit' pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP and return temperature is lower than the MINIMUM RETURN FLOW TEMPERATURE.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	MINIMUM RETURN FLOW TEMPERATURE

Temperature absorption
To avoid an overheating of the kettle, an absorption temperature was set in the control. If the kettle temperature rises up to more than 87 ° C the return flow increase mixer and kettle pump will be opened. Heating circle pumps and 'short circuit' pump are switched on, so that the excessive heat can be dissipated.

Peak load kettle
Peak load kettle (such as oil or gas) is released if the on-off switch is set on OFF, if there is a fault at the kettle or if kettle temperature is longer than the time indicated in DELAY TIME PEAK LOAD KETTLE and lower than NOMINAL TEMPERATURE KETTLE minus HYSTERESE PEAK LOAD KETTLE.

+/-	pumps / buffers	DELAY PEAK LOAD KETTLE
+/-	pumps / buffers	HYSTERESE PEAK LOAD KETTLE
Menu	installation	NOMINAL TEMPERATURE KETTLE

Installation variation 1:
No buffer, no hot-water boiler

MODE OF OPERATION: ON - OFF

Kettle
The kettle switches on if switch ON-OFF is set to ON and the kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE.
The kettle switches off again, if switch ON-OFF is set to OFF or the kettle temperature rises up higher than NOMINAL TEMPERATURE KETTLE.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERE KETTLE TEMPERATURE

Kettle pump
The kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP

Heating circle pumps
The heating circle pumps work if the kettle temperature is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating circle pumps can be switched on and off simultaneously only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

MODE OF OPERATION: CLOCK

Kettle
The kettle switches on if switch ON-OFF is set to ON and the kettle temperature is lower than NOMUNAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE and at least one of the 6 weekly programmes is switched on (active).

The kettle switches off again if switch ON-OFF is switched off or the kettle temperature rises up higher than NOMINAL TEMPERATURE KETTLE or all 6 weekly programmes are switched off (inactive).

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERES KETTLE TEMPERATURE
Menu	weekly programmes	programmes 1 till 6

Kettle pump
The kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP

Heating circle pumps
The heating circle pumps work if the kettle temperature is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / bufferRELEASE TEMPERATURE HEATING CIRCLE PUMPS	

Installation variation 2:
Buffer available, no hot-water boiler

MODE OF OPERATION: ON-OFF

Kettle
The kettle switches on if switch ON-OFF is switched on and the kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE.
The kettle switches off again if switch ON-OFF is switched off or the kettle temperature rises up higher than NOMINAL TEMPERATUR KETTLE.

Parameter:

Menu	Installation	NOMINAL TEMPERATUR KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE

Kettle pump
The kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either kettle works or *temperature of the kettle* is higher than temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Heating circle pumps
The heating circle pumps work if the temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

MODE OF OPERATION: CLOCK

Kettle
The kettle switches on if switch ON-OFF is switched on and the kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE and at least one of the 6 weekly programmes is switched on (active).

The kettle switches off again if switch ON-OFF is switched off or the kettle temperature rises up higher than NOMINAL TEMPERATURE KETTLE or all 6 weekly programmes are switched off (inactive).

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERES KETTLE TEMPERATURE
Menu	weekly programmes	programmes 1 till 6

Kettle pump
The kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either kettle works or *temperature of the kettle* is higher than temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Heating circle pumps
The heating circle pumps work if the temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

MODE OF OPERATION: BUFFER

Kettle
The kettle switches on if switch ON-OFF is switched ON and kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE and the temperature on top of buffer is lower than SWITCH-ON TEMPERATURE ON TOP OF BUFFER.

The kettle switches off again if switch ON-OFF is switched OFF or the kettle temperature is higher than NOMINAL TEMPERATUR KETTLE or if the temperature on top of buffer is higher than SWITCH-ON TEMPERATURE ON TOP OF BUFFER and temperature at button of buffer is higher than SWITCH-OFF TEMPERATURE AT BUTTON OF BUFFER.

Parameter:

Menu	installation	NOMINAL TEMPERATUR KETTLE
+/-	kettle	HYSTERES KETTLE TEMPERATURE
+/-	pumps / buffers	SWITCH-ON TEMPERATURE ON TOP OF BUFFER
+/-	pumps / buffers	SWITCH-OFF TEMPERATURE AT BUTTON OF BUFFER

Kettle pump
The kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either the kettle works or the temperature of the kettle is higher than the temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Heating circle pumps
The heating circle pumps work if the temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Installation variation 3:
Buffer available, hot-water boiler available

MODE OF OPERATION: ON-OFF

Kettle
The kettle switches on if switch ON-OFF is switched ON and the kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE.
The kettle switches off again if switch ON-OFF is switched off or the kettle temperature rises up higher than NOMINAL TEPERATURE KETTLES.

Parameter:

Menu	Installation	NOMINAL TEMPERATUR KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE

Kettle pump
Kettle pump works if the kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either the kettle works or kettle temperature is higher than the temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Heating circle pumps
Heating circle pumps work if the temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. Heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Boiler charge pump
Boiler charge pump switches on if boiler temperature is lower than the HOT-WATER BOILER NOMINAL TEMPERATURE minus the HYSTERES BOILER TEMPERATURE and the temperature on top of buffer is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD and higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Boiler charge pump switches off again if boiler temperature rises up higher than HOT-WATER BOILER NOMINAL TEMPERATURE if the temperature on top of buffer is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD, or if the temperature on top of buffer is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	pumps / buffers	HYSTERES BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD
+/-	pumps / buffers	RELEASE TEMPERATURE BOILER CHARGE PUMP

MODE OF OPERATION: CLOCK

Kettle
Kettle switches on if switch ON-OFF is switched ON and the kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERES KETTLE TEMPERATURE and at least one of 6 weekly programmes is switched on (active).

Kettle switches off again if switch ON-OFF is switched off or the kettle temperature is higher than NOMINAL TEMPERATURE KETTLES or all 6 weekly programmes are switched off (inactive).

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE
Menu	weekly programme	programme 1 till 6

Kettle pump
Kettle pump works if kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either kettle works, or the kettle temperature is higher than the temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	RELEASE TEMPERATURE BUFFER LOAD

Heating circle pumps
Heating circle pumps work if the temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. The heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Boiler charge pump
Boiler charge pump switches on if the boiler temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERES BOILER TEMPERATURE and the *temperature on top of buffer* is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD and higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Boiler charge pump switches off again if boiler temperature is higher than HOT-WATER BOILER NOMINAL TEMPERATURE, if *temperature on top of buffer* is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD, or if the *temperature on top of buffer* is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	pumps / buffers	HYSTERES BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD
+/-	pumps / Buffers	RELEASE TEMPERATURE BOILER CHARGE PUMP

MODE OF OPERATION: BUFFER

Kettle
Kettle switches on if switch ON-OFF is switched ON and kettle temperature is lower than NOMINAL KETTLE TEMPERATURE by more than HYSTERES KETTLE TEMPERATURE HYSTERES and temperature on top of buffer is lower than SWITCH-ON TEMPERATURE ON TOP OF BUFFER.

Kettle switches off again if switch ON-OFF is switched OFF or kettle temperature rises up higher than NOMINAL KETTLE TEMPERATURE or temperature on top of buffer is higher than SWITCH-ON TEMPERATURE ON TOP OF BUFFER and temperature at button of buffer is higher than SWITCH-OFF TEMPERATURE AT BUTTON OF BUFFER.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE
+/-	pumps / buffers	SWITCH-ON TEMPERATURE ON TOP OF BUFFER
+/-	pumps / buffers	SWITCH-OFF TEMPERATURE AT BUTTON OF BUFFER

Kettle pump
Kettle pump works if kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP **and** either kettle works or kettle temperature is higher than temperature on top of buffer plus DIFFERENCE TEMPERATURE BUFFER LOAD.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Heating circle pumps
Heating circle pumps work if temperature on top of buffer is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. Heating circle pumps can switched on and off simultaneously, only..

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Boiler charge pump
Boiler charge pump switches on if the boiler temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERESE BOILER TEMPERATURE and temperature on top of buffer is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD and higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Boiler charge pump switches off again if temperature is higher than HOT-WATER BOILERS NOMINAL TEMPERATURE if temperature on top of buffer is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD or if temperature on top of buffer is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	pumps / buffers	HYSTERES BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER
+/-	pumps / buffers	RELEASE TEMPERATURE BOILER CHARGE PUMP

Installation variation 4:
Hot-water boiler available, no buffer

MODE OF OPERATION : ON-OFF

Kettle
Kettle switches on if switch ON-OFF is switched ON and kettle temperature is lower than NOMINAL KETTLE TEMPERATURE by more than the HYSTERESE KETTLE TEMPERATURE.
Kettle switches off again if switch ON-OFF is switched OFF or kettle temperature is higher than NOMINAL KETTLES TEMPERATUR.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE

Kettle pump
Kettle pump works if kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP

Heating circle pumps
Heating circle pumps work if kettle temperature is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. Heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Boiler charge pump
Boiler charge pump switches on if boiler temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERESE BOILER TEMPERATURE and kettle temperature is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD and higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.
Boiler charge pump switches off again if boiler temperature is higher than HOT-WATER BOILER NOMINAL TEMPERATURE if kettle temperature is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD, or if kettle temperature is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Parameter:

Menu	Installation	NOMINAL TEMPERATUR HOT-WATER BOILER
+/-	pumps / buffers	HYSTERESE BOILER TEMPERATURE
+/-	pumps / buffer	DIFFERENCE TEMPERATURE BUFFER LOAD
+/-	pumps / buffer	RELEASE TEMPERATURE BOILER CHARGE PUMP

MODE OF OPERATION: CLOCK

Kettle
Kettle switches on if switch ON-OFF is switched ON and kettle temperature is lower than NOMINAL TEMPERATURE KETTLE by more than HYSTERESE KETTLE TEMPERATURE and at least one of 6 weekly programmes is switched on (active).

Kettle switches off again if switch ON-OFF is switched off or kettle temperature is higher than NOMINAL KETTLE TEMPERATUR or all 6 weekly programmes are switched off (inactive).

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
+/-	kettle	HYSTERESE KETTLE TEMPERATURE
Menu	weekly programme	programme 1 till 6

Kettle pump
Kettle pump works if kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE KETTLE PUMP

Heating circle pumps
Heating circle pumps work if kettle temperature is higher than RELEASE TEMPERATURE HEATING CIRCLE PUMPS. Heating circle pumps can be switched on and off simultaneously, only.

Parameter:

+/-	pumps / buffers	RELEASE TEMPERATURE HEATING CIRCLE PUMPS

Boiler charge pump
Boiler charge pump switches on if boiler temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERESE BOILER TEMPERATURE and kettle temperature is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD and higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Boiler charge pump switches off again if boiler temperature is higher than HOT-WATER BOILER NOMINAL TEMPERATURE if kettle temperature is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD, or if kettle temperature is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	pumps / buffers	HYSTERESE BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD
+/-	pumps / buffers	RELEASE TEMPERATURE BOILER CHARGE PUMP

MODE OF OPERATION: BUFFER

Kettle
Kettle switches on if switch ON-OFF is switched ON, kettle temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE and by more than HYSTERESE KETTLE TEMPERATURE lower than KETTLE NOMINAL TEMPERATUR and the temperature in the boiler has dropped under HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERESE BOILERTEMERATUR.

The kettle switches off again if switch ON-OFF is switched off or kettle temperature is higher than HOT-WATER BOILER NOMINAL TEMPERATURE plus DIFFERENCE TEMPERATURE BUFFER LOAD or higher than KETTLE NOMINAL TEMPERATURE, or if temperature in the boiler reaches HOT-WATER BOILER NOMINAL TEMPERATURE.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE KETTLE
Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	kettle	HYSTERESE KETTLE TEMPERATURE
+/-	pumps / buffers	HYSTERESE BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD

Kettle pump
Kettle pump works if kettle temperature is higher than RELEASE TEMPERATURE KETTLE PUMP.

Parameter:

+/-	pumps / buffer	RELEASE TEMPERATURE KETTLE PUMP

Heating circle pumps
Heating circle pumps do not work in this mode of operation (with exception of absorption temperature).

Boiler charge pump
Boiler charge pump switches on if boiler temperature is lower than HOT-WATER BOILER NOMINAL TEMPERATURE minus HYSTERESE BOILER TEMPERATURE and kettle temperature is higher than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD but higher than RELEASE TEMPERATURE BOILER CHARGE PUMP.
Boiler charge pump switches off again if boiler temperature is higher than HOT-WATER BOILER NOMINAL TEMPERATURE if kettle temperature is lower than boiler temperature plus DIFFERENCE TEMPERATURE BUFFER LOAD, or if kettle temperature is lower than RELEASE TEMPERATURE BOILER CHARGE PUMP.
Boiler charge pump works additionally, if kettle temperature is higher than 80°C.

Parameter:

Menu	Installation	NOMINAL TEMPERATURE HOT-WATER BOILER
+/-	pumps / buffers	HYSTERESE BOILER TEMPERATURE
+/-	pumps / buffers	DIFFERENCE TEMPERATURE BUFFER LOAD
+/-	pumps / buffers	RELEASE TEMPERATURE BOILER CHARGE PUMP

11.1 Pump programme AM I - Compact

Short circuit pump (backflow booster pump) to K12:

This pump switches no matter whether installation is switched on or switched off.

ON: Kettle temperature> *release temperature kettle pump*
and
Return temperature <*Nominal return temperature*

OFF: If switch-ON conditions are not fulfilled

Heating circle pump (heating circle release) to K14:

This pump switches no matter whether installation is switched on or switched off.
There is no heating circle release during operation of the boiler, i.e. the heating circle pumps are not switched on.

- **with buffer:**
  ON: Buffer temperature on top> *release temperature heating circle pumps*

  OFF: if switch-ON conditions are not kept

- **without buffer memory:**
  ON: kettle temperature> *release temperature heating circle pumps*

  OFF: If switch-ON condition is not kept

Buffer charge pump (kettle pump) to K11

This pump switches no matter whether installation is switched on or switched off.

- **with buffer:**
  ON: kettle temperature> *release temperature kettle pump*
  and
  kettle temperature> buffer temperature on top + *difference temperature buffer (3°C fixed*)
  or
  system in operation

  OFF: If switch-ON conditions are not kept

- **without buffer:**
  ON: kettle temperature> *release temperature kettle pump*

  OFF: if switch-ON condition is not kept

Boiler charge pump to K13:

This pump switches no matter whether the installation is switched on or switched off.

- **with buffer and mode of operation "buffer":**

ON:	boiler temperature	<	*boiler nominal temperature – boiler hysterese*
OFF:	boiler temperature	>	*boiler nominal temperature*
RELEASE:	buffer temperature on top>		*release temperature boiler pump*
	and		
	buffer temperature on top>		boiler temperature + *difference temperature buffer load (3°C fixed)*

- **without buffer and mode of operation "buffer":**

ON:	boiler temperature	<	boiler nominal temperature – boiler hysterese
	or		
	kettle temperature	>	80°C
OFF:	boiler temperature	>	boiler nominal temperature
RELEASE:	kettle temperature	>	*release temperature boiler pump*
	and		
	kettle temperature	>	boiler temperature + *difference temperature buffer load (3°C fixed)*

- **modes of operation “ON-OFF”, "clock":**

ON:	boiler temperature	<	*boiler nominal temperature – boiler hysterese*
OFF:	boiler temperature	>	*boiler nominal temperature*
RELEASE:	kettle temperature	>	*release temperature boiler pump*
	and		
	kettle temperature	>	boiler temperature + *difference temperature buffer load (3°C fixed)*

Absorption temperature:

For safety reasons all connected pumps will be switched on and back-flow mixer will be opened at a kettle temperature of 87°C.

12) Chimney connection

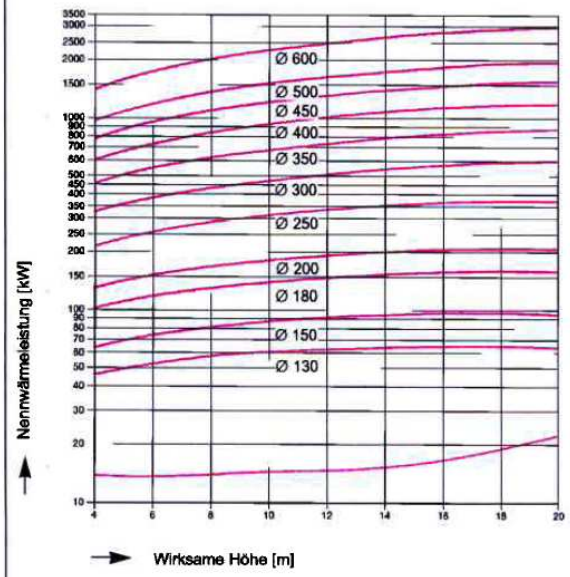
Connection of the heating installation with the chimney

The right dimensioning of the chimney is a condition for a proper operation of the heating installation. The dimensions are to be calculated to DIN 4702. The values relevant for the calculation are given by the manufacturer for the corresponding capacity of the kettle and type of fuel., In addition the local and state regulations shall apply. The selection of the chimney installation is to be tuned with the responsible chimney sweep before installation of the heating system.
For heating installations with power control flue gas temperatures can lead to less than 100°C at lower power range operation. In this case the heating installation is to be connected to high-insulated chimneys.
(Effective thermal resistance 1 according to DIN 18160 T 1).
For high or strongly fluctuating flue an installation of a flue limiter could be advisable.
The connection parts to the chimney are to be mounted slightly upward (in flow direction) and to be insolated if necessary.

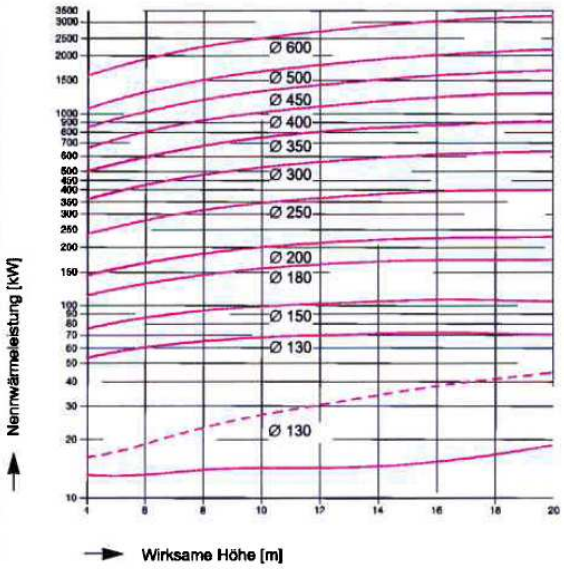
Diagramme DIN 4705

Teil 1 Ausgabe Oktober 1993

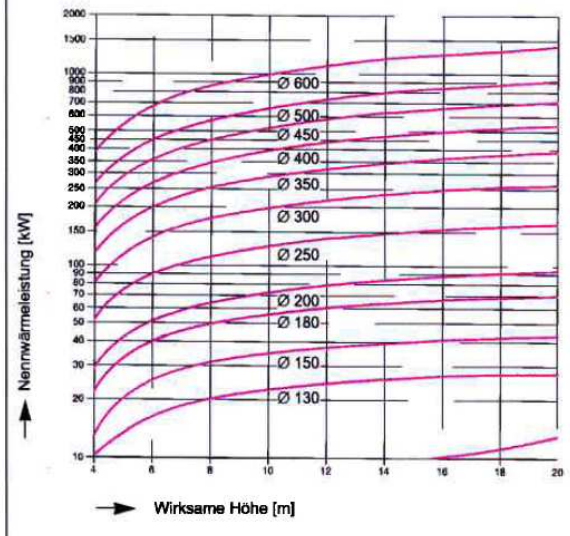
Metaloterm® AT
Gas/Öl Gebläse, 120° C, Unterdruck,
0 Pa Förderdruck, CO_2 10%/13,5



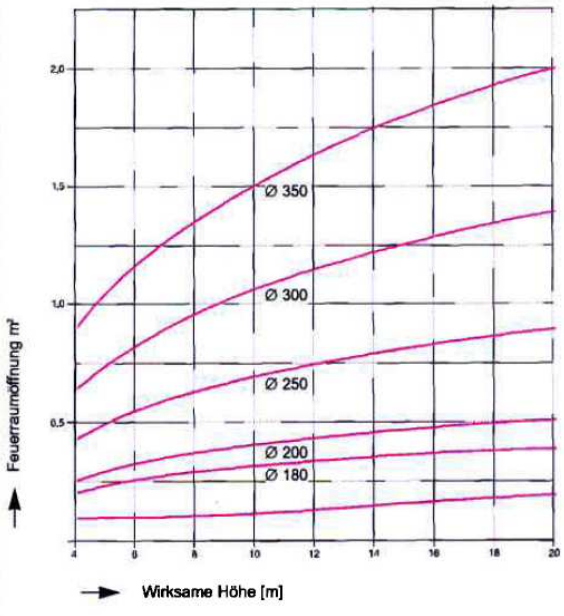
Metaloterm® AT
Gas/Öl Gebläse, 160° C, Unterdruck,
0 Pa Förderdruck, CO_2 10%/13,5



Metaloterm® AT
Holz 200° C, Unterdruck,
Förderdruck 10 Pa, CO_2 nach DIN



Metaloterm® AT
Offener Kamin,
Förderdruck nach DIN, CO_2 nach DIN



Ø Maße in mm

Technische Änderungen vorbehalten

13) Circuit diagram

13.1 Cable numbering C0, C1, C1L switch cabinet

Nr.1 installation 16-pole socket, primary fan, secondary fan, TRB, STB, ashes thermostat, ignition, induced draft fan, limit switch, door sensor

Nr.2 sensors 10-pole socket, lambda sensor, flue gas sensor, flow – return sensors

Nr.3 stoker engine 7-pole socket

Nr.4 discharge screw conveyor 7-pole socket

Nr.5 ashes transverse screw 7-pole socket

Nr.6 ascending screw 7-pole socket OPTION

Nr.7 ashes slide 3-pole socket, power supply control box

Nr.8 ashes slide 3-pole plug, directional control

Nr.9 ashes slide 5-pole socket, limit switch

Nr.10 fire shutter 3-pole socket, engine

Nr.11 fire shutter 3-pole socket, limit switch

Nr.12 limit switch 3-pole socket, overfill cover conveyor

Nr.13 limit switch 3-pole socket, overfill cover ascending screw OPTION

Nr.14 low-pressure measurement, directly connected

Nr.15 second fuel line OPTION

Nr.16 transverse screw 7-pole socket OPTION

Nr.17 hydraulics OPTION

Nr.18 pendulum removable floor OPTION

Nr.19 differential pressure-transmitter huba 694. 911015040, directly to connect

14) Guarantee:

The following guarantee is valid for the Compact-wood chip installation:

2 years
however, 1-year guarantee for all parts of the kettle exposed to fire and all mechanical moving parts, from the day of the delivery.

Parts subject to wear are excluded from guarantee.

No guarantee is assumed for storage room and/or bridging caused by fuel.

Guarantees and warranties are given only, if instructions of operating instructions are followed.

The guarantee ceases particularly in case of not properly treated return flow increase.

General information:

Slight cracks in refractory lining are dry splitting and are no malfunction!

In case kettle is moist or wet inside check heating water temperature of kettle and back flow - none of these temperatures must not have less than 65 ° C – risk of corrosion!!! - (disclaimer of warranty).

To fill up the installation:

Mixer half opened
Pump to switch off
Gravity brake setting on "open"

Interruption in operation:

Kettle clean carefully!
All doors and covers close!
To empty perhaps (in case of risk of frost)

In case of malfunctions by inproper operation of installation or by unsuitable fuel (see side BA-4), the warranty is cancelled.

The scope of legal warranty encloses delivery of defective parts within a/m warranty.
Mounting times, travel costs, as well as necessary release are charged and are to be paid by the plant operator.

Spare parts: Spare parts can be ordered anytime by stating Com number, factory number, and name of defective part.

(Com number and factory number are to be found on the type shield)

15) Operating instructions for combustion optimization AM I

Operating instruction

of combustion optimization control

AM I

for ÖKO THERM Compactsystems

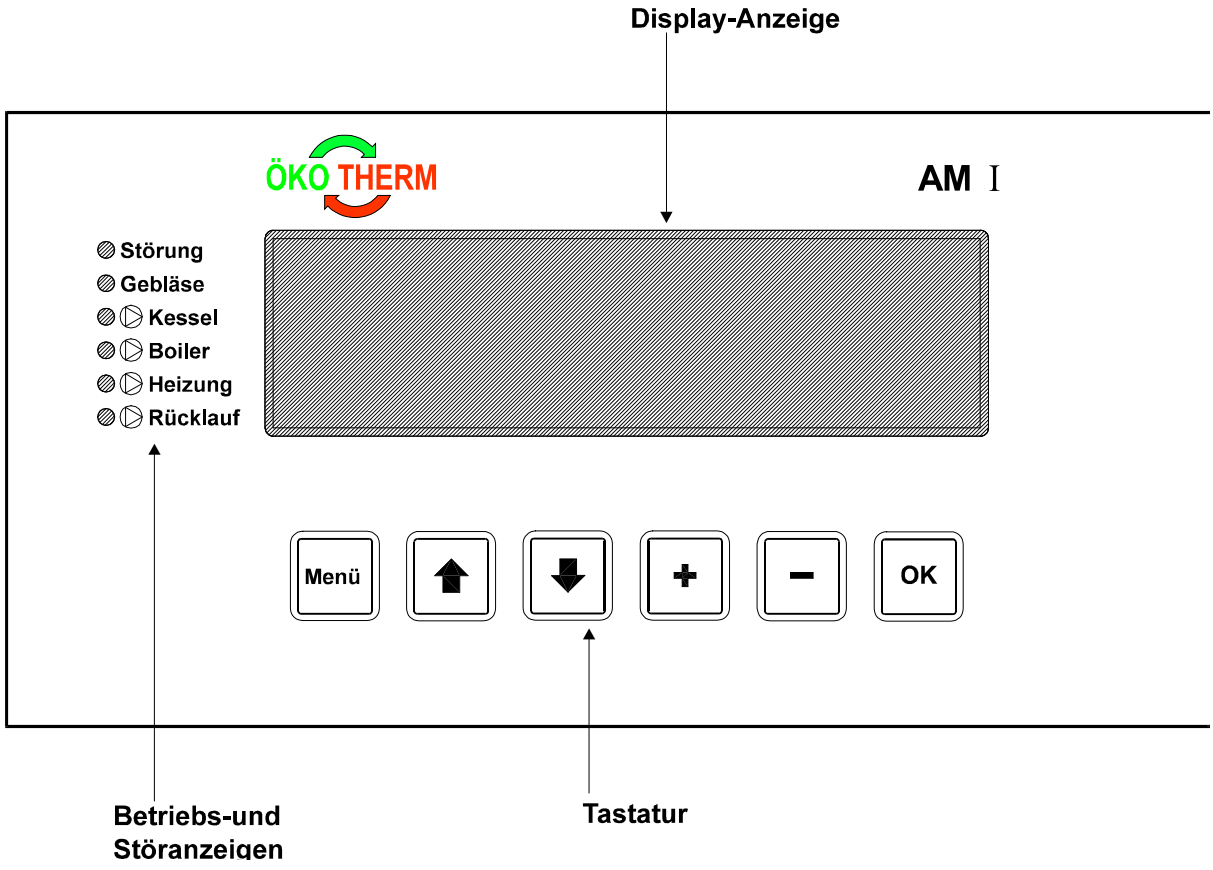


Table of contents

		Page
1.	**Introduction**	**3**
1.1	Construction overview	3
1.2	Display	3
1.3	Keyboard	4
1.4	Operating and malfunction indicator	4
2.	**Switch-ON of the control**	**5**
3.	**Standard displays**	**6**
3.1	General	6
3.2	Current operating information	7
3.3	Mode of operation, date and time	9
3.4	Buffer temperatures	10
3.5	Sensor values and operating data	10
3.6	Ignition current and motor current	11
4.	**Menue: Customer setting**	**12**
4.1	General	12
4.2	Installation settings	14
4.3	Test mode	20
4.4	Manual ash removal	31
4.5	Timer	32
4.6	Date and time setting	33
4.7	Startup setting load?	34
5.	**Malfunctions and repair**	**35**

16) Malfunctions and repair

ATTENTION:

During work on the installation it must be guaranteed, that system cannot automatically be switched on.

Main switch "OFF"!!!

If hydraulic back fire protection is activated additionally the pressure accumulator must be emptied completely!!

Display is inoperative

possible causes:	1. power failure 2. main switch or heating emergency switch „OFF“ 3. board fuse blew
repair:	1. check power supply 2. main switch and heating emergency switch„ON“ 3. check fuse to replace if necessary

Smoke emission in the heating room

Flue or heating surface oft he kettle dusted.

To clean kettle or chimney or to get them clened.

Moist material

Use chips or chippings with a max. water content of 35 %, only. (see instruction, page BA-4)

EG-Konformitätserklärung
Gemäß EG-Richtlinie Maschinen
98/37 EWG (Anhang II A)

Hiermit erklären die Firma A.P. Bioenergietechnik GmbH, Träglhof 2, 92242 Hirschau, dass die nachstehend bezeichnete Maschine in ihrer Konzipierung und Bauart sowie in der von uns in Verkehr gebrachten Ausführung den grundlegenden Sicherheits- und Gesundheitsanforderungen der EG-Richtlinie Maschine entspricht. Bei einer mit uns nicht abgestimmten Änderung der Maschine verliert diese Erklärung ihre Gültigkeit.

Bezeichnung der Maschine: Compactanlage

Maschinentyp: C0, C1, C1L

Zutreffende EG-Richtlinien:
EG-Maschinenrichtlinie (98/37/EG) in der geltender Fassung
EG-Niederspannungsrichtlinie (73/23/EWG) in der geltenden Fassung
EG-EMV-Richtlinie (89/336/EWG) in der geltenden Fassung

Angewandte harmonisierte Normen:
EN 292 T1, EN 292 T2, EN 303-5, EN 414, EN 60204-1

Angewandte nationale Normen und technische Spezifikationen:
DIN 4702, TRD 702,

ÖKO THERM
A.P.Bioenergietechnik GmbH
Träglhof 2
92242 Hirschau

Hirschau, 01.08.2006

Herbert Fellner
Geschäftsführer